

5 WHAT IS CLAIMED IS:

1. A lumbar support with a variable apex comprising:

at least one guide element adapted to be disposed within a seat, said guide element having an upper stop and a lower stop;

- 10 a bowing element disposed to travel on said guide element, said bowing element having an upper portion and a lower portion;

- 15 a first traction element operatively engaged to draw said upper portion of said bowing element toward said lower portion of said bowing element such that said lower portion of said bowing element is drawn into abutment with said lower stop and such that a first convexity is formed in said bowing element as said traction element continues to draw said upper portion of said bowing element further towards said lower stop; and

- 20 a second traction element operatively engaged to draw said lower portion of said bowing element toward said upper portion of said bowing element such that said upper portion of said bowing element is drawn into abutment with said upper stop and such that a second convexity is formed in said bowing element as said traction element continues to draw said lower portion of said bowing element further towards said upper stop.

- 25 2. The lumbar support of claim 1 wherein said bowing element travels in a substantially vertical plane.

3. A lumbar support with an apex that travels vertically comprising:

- 30 at least one guide element adapted to be disposed within a seat, said guide element having an upper stop and a lower stop;

- a bowing element disposed to travel on said guide element, said bowing element having an upper portion and a lower portion;

- 35 a mount attached to said guide element between said upper stop and said lower stop; and

- 40 at least one traction element operatively engaged to draw one of said upper portion or said lower portion of said bowing element toward said mount such that the other of said upper portion or said lower portion of said bowing element is drawn into abutment with one of said upper stop or said lower stop and such that a convexity is formed in said bowing element as said traction element

- 5 continues to draw one of said upper portion or said lower portion further towards said mount.
4. The lumbar support of claim 3 wherein said bowing element travels in a substantially vertical plane.
- 10 5. A lumbar support with variable apex height comprising:
- at least one guide rail having a top stop and a bottom stop and having a central bracket;
- 15 an archable pressure surface slidably disposed on said guide rail, said archable pressure surface having an upper portion and a lower portion, said upper portion and lower portion being closer together than said top stop and said bottom stop of said guide rail when said archable pressure surface is arched;
- 20 a first bowden cable having a first sleeve anchored to said upper portion of said archable pressure surface and said first bowden cable having a first wire slidably disposed within said first sleeve, said first wire being anchored to said central bracket of said guide rail such that when said first wire of said first bowden cable is drawn into said first sleeve of said first bowden cable, a downward traction on said archable pressure surface is stopped by said bottom stop of said guide rail and a low arch is formed; and
- 25 a second bowden cable having a second sleeve anchored to said lower portion of said archable pressure surface and said second bowden cable having a second wire slidably disposed within said second sleeve, said second wire being anchored to said central bracket of said guide rail such that when said second wire is drawn into said second sleeve of said second bowden cable, an upward traction on said archable pressure surface is stopped by said top stop of said guide rail and a high arch is formed.
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- 35 6. The lumbar support of claim 5 wherein at least one of said first or second sleeves are anchored to said upper portion or said lower portion of said archable pressure surface via a spring.
7. The lumbar support of claim 5 wherein said first bowden cable and said second bowden cable are opposing ends of a single bowden cable.

- 5 8. The lumbar support of claim 5 further comprising an actuator being engaged with said first bowden cable and said actuator being engaged with said second bowden cable such that activation of said actuator in a first direction draws said first wire into said first sleeve and activation of said actuator in a second direction draws said second wire into said second sleeve.
- 10 9. The lumbar support of claim 8 wherein said actuator is a rotating actuator and said activation is rotation.
10. The lumbar support of claim 8 wherein said actuator is activated by an electric motor.
11. The lumbar support of claim 5 wherein said archable pressure surface is further
15 comprised of:
- at least two mounting brackets, each slidably disposed on said guide rail between said upper stop and said lower stop, each of said mounting brackets having a bowden cable sleeve anchor and each of said mounting brackets having
20 at least two concavities;
- at least two flexible pressure rods having two ends, each of said ends being pivotally engaged with said concavities; and
- a plurality of lateral wires attached to each of said flexible pressure rods.
- 25 12. The lumbar support of claim 5 further comprising a vibrator.
13. A lumbar support with a high apex and a low apex comprising:
- at least one guide rail having at least one upper stop and at least one lower stop and having a central bracket between said upper stop and lower stop;
30 an upper mounting bracket and a lower mounting bracket, each slidably disposed on said at least one guide rail;
- at least two flexible pressure rods each having an upper end pivotally attached to said upper mounting bracket and a lower end pivotally attached to said lower mounting bracket;
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a plurality of wires each attached to each of said at least two flexible pressure rods;

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a first bowden cable having a first sleeve and a first wire, said upper mounting bracket being attached to one or the other of said first sleeve or first wire of said first bowden cable and said central bracket being attached to the other of said first sleeve or said first wire of said first bowden cable such that traction of said first bowden cable draws said upper mounting bracket towards said central bracket, whereby said lower mounting bracket is drawn into abutment with said lower stop of said guide rail and said at least two flexible pressure rods bow outward; and

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a second bowden cable having a second sleeve and a second wire, said lower mounting bracket being attached to one or the other of said second sleeve or said second wire of said second bowden cable and said central bracket being attached to the other of said second sleeve or said second wire of said second bowden cable such that traction of said second bowden cable draws said lower mounting bracket towards said central bracket whereby said upper mounting bracket is drawn into abutment with said upper stop of said guide rail and said at least two flexible rods bow outward.

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14. A lumbar support with variable apex height comprising:

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at least one guide rail having a top stop and a bottom stop and having a central bracket;

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an archable pressure surface slidably disposed on said guide rail, said archable pressure surface having an upper portion and a lower portion, said upper portion and lower portion being closer together than said top stop and said bottom stop of said guide rail when said archable pressure surface is arched;

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a first bowden cable having a first sleeve anchored to said upper portion of said archable pressure surface and said first bowden cable having a first wire slidably disposed within said first sleeve, said first wire being anchored to said central bracket of said guide rail such that when said first wire of said first bowden cable is drawn into said first sleeve of said first bowden cable, a downward traction on said archable pressure surface is stopped by said bottom stop of said guide rail and a low arch is formed;

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a second bowden cable having a second sleeve anchored to said lower portion of said archable pressure surface and said second bowden cable having a second wire slidably disposed within said second sleeve, said second wire being anchored to said central bracket of said guide rail such that when said second wire is drawn into said second sleeve of said second bowden cable, an

5 upward traction on said archable pressure surface is stopped by said top stop of said guide rail and a high arch is formed;

an electric motor operatively engaged to each of said first and second bowden cables to draw said bowden cable wires into said bowden cable sleeves; and

10 a processor operatively engaged to control said electric motor, said processor being programmed to

15 automatically draw said first wire into said first sleeve of said first bowden cable, such that a downward traction on said archable pressure surface is stopped by said bottom stop of said guide rail and a low arch is formed and

20 then draw said second wire into said second sleeve of said second bowden cable, such that an upward traction on said archable pressure surface is stopped by said top stop of said guide rail and a high arch is formed.

15. The lumbar support of claim 14 wherein said processor is further programmed
25 to repeat said automatic drawing of said first bowden cable and said second bowden cable, said repetition continuing for a pre-configured time.

16. A lumbar support with variable apex height comprising:
30 at least one guide rail having a top stop and a bottom stop and having a central bracket;

35 an archable pressure surface slidably disposed on said guide rail, said archable pressure surface having an upper portion and a lower portion, said upper portion and lower portion being closer together than said top stop and said bottom stop of said guide rail when said archable pressure surface is arched;

40 a first bowden cable having a first sleeve anchored to said upper portion of said archable pressure surface and said first bowden cable having a first wire slidably disposed within said first sleeve, said first wire being anchored to said central bracket of said guide rail such that when said first wire of said first bowden cable is drawn into said first sleeve of said first bowden cable, a downward traction on said archable pressure surface is stopped by said bottom stop of said guide rail and a low arch is formed;

45 a second bowden cable having a second sleeve anchored to said lower portion of said archable pressure surface and said second bowden cable having a second

5 wire slidably disposed within said second sleeve, said second wire being anchored to said central bracket of said guide rail such that when second said second wire is drawn into said second sleeve of said second bowden cable, an upward traction on said archable pressure surface is stopped by said top stop of said guide rail and a high arch is formed;

10 an actuator housing anchoring each of said first and second sleeves of said first and second bowden cables;

15 an actuator wheel disposed within said actuator housing, said actuator wheel being operatively engaged to each of said first and second wires of said first and second bowden cables such that rotation of said actuator wheel in a first direction draws said first wire into said first sleeve of said first bowden cable, and rotation of said actuator wheel in a second direction draws said second wire into said second sleeve of said second bowden cable,

20 an electric motor operatively engaged to said actuator wheel; and

25 a processor operatively engaged to control said electric motor, said processor being programmed to automatically draw said first wire into said first sleeve of said first bowden cable, such that a downward traction on said archable pressure surface is stopped by said bottom stop of said guide rail and a low arch is formed and then draw said second wire into said second sleeve of said second bowden cable, such that an upward traction on said archable pressure surface is stopped by said top stop of said guide rail and a high arch is formed.

30 17. The lumbar support of claim 14 wherein said processor is further programmed to repeat said automatic drawing of said first bowden cable and said second bowden cable, said repetition continuing for a pre-configured time.

18. The lumbar support of claim 14 further comprising a vibrator.

35 19. A method of assembling an ergonomic support that has two apexes comprising:

40 constraining a travel path of an archable pressure surface between an upper stop and a lower stop of a guide element;

disposing said archable pressure surface flat on said guide element between said upper stop and said lower stop;

fixing a first traction element to a first half of said archable pressure surface such that traction on said first traction element draws said first half of said archable

- 5 pressure surface toward said upper stop to create an upper apex in said archable pressure surface; and
- 10 fixing a second traction element to a second half of said archable pressure surface such that traction on said second traction element draws said second half of said archable pressure surface toward said lower stop to create a lower apex in said archable pressure surface.
20. The method of claim 19 wherein said travel path of said archable pressure surface is substantially vertical.
- 15 21. The method of claim 19 wherein said traction element is a bowden cable.